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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/617,254	07/14/2000	Hiroshi Shiniki	194264US-2-DIV	9218
22850	7590	02/17/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			PADGETT, MARIANNE L	
			ART UNIT	PAPER NUMBER
			1762	
DATE MAILED: 02/17/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/617,254

Applicant(s)

SHINRIKI ET AL.

Examiner

Marianne L. Padgett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 57,58,62-67,69-75,77-83 and 85-101 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 57,58,62-67,69-75,77-83 and 85-101 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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1). A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/4/04 has been entered.

2). The drawings are objected to because in Figure 14, there is no reference # 244, which is indicated on p. 50 to be present in the apparatus, as the showerhead. It appears that it is process labeled as # 224. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3). Claims 86-89 & 92-93 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants have cited figures 14-15 and pages 50-52 as provides support for these new claims, however a subtle change in language has produced an supported (and probably unintended) new limitation. In claims 86, 88 and 92, it is claimed that “the showerhead that has a projection area projected on the... object... is smaller than 20%...” (emphasis added), however on p. 51, lines 1-8, it is “the projection area of the gas injection pipes 312 with respect to the wafer W... set to be smaller than 20% of the surface area of the wafer” (emphasis added) which is disclosed. These are two very different things. The claims are limiting the projection of gas on to the substrate to less than 20% of its surface area, but the specification is limiting the area on the pipes that projects gas to that substrate surface area, as opposed to the area that receives the projected gas. The claims are essentially requiring patterned or extremely limited exposure, while the examiner would suppose that the purpose of the Fig. 14-15 configurations is to enable the UV light to not be obstructed by the input grid, but to still have an even or uniform gas exposure, just the opposite of what is actually or literally claimed! Therefore, these claims as written contain New Matter.

4). Claim 101 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As written claim 101 does not make much sense. The “container-shaped lid” is not a clear description, and “shaped” is not an expectable modifier. What shape of container does the “lid” resemble? It appears to be claimed to be a lid for the work table, which would imply that it separates the worktable from the substrate and the rest of the chamber, but lines 4-6 appear to contradict lines 2-3, unless one takes “the lid sandwiching the ... object” to mean that the “lid” totally encase the object, i.e. completely surrounds it, with the lid being hollow and containing the substrate, with the “lid” resting on the worktable. The cited Fig. 17-19 and their description do not support this.

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5). Claim 101 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The possible interpretations as discussed above, include New Matter. The description of Fig. 17 discusses showerhead 244 having “a circular container-shaped lid 316” which is illustrated to have “a lower open end portion” on the surface of the mounting table 214, such that it encloses the wafer (substrate or object). Calling this enclosure a lid is a bit confusing, but consistent wording that might more accurately describe applicants’ intent, might include: --a container having a lower open end portion on an upper surface of the worktable, so as to enclose the object and having..., wherein the...flow is formed in the container, and between...disposed on two opposite sides of the container with the...object between the ports--.

6). Claims 57-58, 62-67, 69-75, 77-83 and 85-94 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

While the modified amendment to the independent claims is an improvement over the proposal of the 7/2/04 after final amendment, it still inputs gas from the claimed showerhead grid in a broader scope than original disclosure, since the injection holes as claimed may flow the gas into the vessel in some direction other than towards the substrate, however the supporting figures 14-15 and pages 50-52 all flow the gas towards the claimed object. While Fig. 17-19 have flow that is horizontal, the showerhead with these apparatus does not use a grid, so this embodiment provides no support for broadening the claims. Therefore, as written them independent claims appear to include New Matter in their breath, which would

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be removed by, for example inserting --towards the object-- after "vessel" in line 11 of claim 57, and correspondingly in the other independent claims.

7). Claims 57-58, 62-67, 69-75, 77-83 and 85-94 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the claimed showerhead directing gas towards the substrate in the vessel, does not reasonably provide enablement for directing the gas in any other direction within the vessel. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. See section 6 above.

8). The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9). It is noted that the claims have been amended (10/4/04) such that independent claims 56 and 69 no longer require the limitation of adding N<sub>2</sub> to the O<sub>2</sub> feed to increase O<sub>3</sub> generation efficiency; consequently Harada (5,792,326) or JP1-298,003 A are no longer required to supply it. However this limitation is still present in dependent claims 62 and 70. Independent claim 77 has been amended to no longer be limited to excimer lamps, but now include all UV radiating systems; consequently Usuki

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(5,914,151) or Hiramoto et al (5,510,158) are no longer required to show the usefulness of such lamps.

All these claims as amended, plus new claim 90 require the use of showerhead configurations to input the gas into the processing vessel, where the showerhead comprises pipes with outlet holes, to input the reaction gas into the reaction vessel, but with no particular distribution or direction with respect to the object being treated with oxygen.

New independent claim 95 is analogous to 90, except with a gas input configuration that does not require a showerhead, but does provide for horizontal gas flow above the object being exposed to active oxygen.

10). Claims 95-100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jinriki et al (JP 02-283,022), in view of Harris (5,698,472).

Jenriki et al (also see translation) is previously discussed in Section 8 of paper #5 (mailed 4/26/02) and sections 4 & 6 of the action mailed 4/2/04. Jinriki et al's disclosure has 5 figures showing apparatus used: Fig. 7 where gases including generated  $O_3$  are schematically shown input from below the substrate, with exhaust line 120 for pumps 106+107 also shown below; Fig. 13-14 appear to input  $O_2$  or  $O_2/O_3$  from above, and exhaust from below; while Fig. 18 and 20 appear to show gas ( $O_2/O_3$ ) input and exhausted (to pumps) on a line which would produce horizontal flow and be above the substrates (actual substrate orientation is immaterial to claims as written). However, all these figures are schematics, and no actual discussion of input locations or flow directions were found in the translation, so while Fig. 18 and 20 suggest figuratively horizontal flow as claimed, especially for additional in chamber excitation from heating, Jinriki et al does not have any actual teachings concerning this limitation.

Harris, who is also teaching performing oxidation on a deposited film via a process requiring input of heat,  $O_2$  and UV, teaches a configuration as claimed (abstract; Fig. 1; col. 2, line 46-67; col. 3, lines 60 – col. 4, line 59), providing the advantage of uniform gas flow over the substrate during the oxidative treating with the UV source 10 supplied from above, which is consistent with Jinriki et al Fig. 7,

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where the orientation of UV lamp and substrates is not in question. It would have been obvious to one of ordinary skill in the art to employ the UV irradiation and reactive gas flow configuration of Harris for Jinriki et al's oxidation process, as it is consistent with the primary reference's teachings and schematic diagrams, plus provides the advantage of uniform flow which would have been equally necessary or important in Jinriki et al's oxidation process.

Neither Harris nor Jinriki et al discuss whether there are single or plural delivery holes at the gas input port, however lacking any specific configuration or effect, it would have been obvious to one of ordinary skill to employ multiple input holes for the reactive gas input depending on the reaction chamber dimensions and area that is needed to be have the O-flow spread uniformly across as taught, in order to fulfill the taught objectives of Harris.

11). Morishige et al (4,711,790) is cited as of interest for also teaching/illustrating horizontal gas flow, with respect to the substrate, that may be O<sub>2</sub>, where UV radiation is applied perpendicular to substrate and flow to effect a photochemical reaction.

12). Claims 57-58, 63-67, 71-75, 77-83, 85, 90-91 and 94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jinriki et al, in view of Bersin (4,687,544) or Green et al (5,863,843), optionally considering Ishii (5,683,537).

As noted above, Jinriki et al does not have any specific limitations on location or means of oxidative gas input, and there is no suggestion or illustration of a showerhead configuration above the object being treated with active oxygen. Both Bersin (abstract; Figure 1; col. 1, lines 10-18; col. 2, lines 55-62; col. 3, lines 17-24 & 59-64; col. 4, lines 11-37 & 64 – col. 5, lines 16 & 35-45; and col. 6, lines 15-39) and Green et al (abstract; Fig. 3; col. 3, lines 17-33; col. 4, lines 41-52<sup>+</sup>; col. 6, lines 52- col. 7, line 31) use a combination of heating and UV irradiation or lamp irradiation to effect chemical reactions via gas that may be oxygen input via a showerhead configuration above the substrate, but below the UV or irradiation source. The reactive oxygen gas is injected into the reaction zone via a plurality of holes to



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distribute the reaction gas over the surface being treated. Neither reference discuss whether the shower-head's construction has a plurality of pipes in a grid or not, and only illustrate a cross-section of the holes. However, it would have been obvious to one of ordinary skill in the art that as the surface areas being treated are generally planer surfaces, that the row of illustrated injection holes would extend in a 2-D array or grid of input holes in order to distribute the gas input as taught above the entire surface being treated. It would have been a matter of competent workmanship to make such an arrangement via any gas conducting means that would uniformly supply the gas to the array of holes. Considering in both cases the gas is supplied by a pipe, to make the array of input hole via a grid of input pipes would have been an obvious means of achieving such due to practical considerations of delivery and maintaining gas pressure, especially lacking any significant relationship between the input and the process requirements. Ishii (Fig. 3-4; col. 4, lines 14-28) optionally provides pipe arrangements with plural holes to distribute gas delivery, providing additional motivation therefore.

13). Claims 62 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jinriki et al, in view of Bersin or Green et al as applied to claims 57-58, 63-67, 69, 71-75, 77-83, 85, 90-91 and 94 above, and further in view of JP1-298,003 A or Harada et al (5,792,326), as applied in section 6 of the 4/2/04 action.

14). Claims 86-89, 92-93 and 101 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

If the examiner is correct in interpreting how applicants probably intended to claim the limitations of these claims, it appears that if their 112 problems are adequately clarified, etc., that they will define particular gas distribution processes that as combined with the UV radiation systems provide different means and solutions to the uniformity, or without interference distribute both gas and radiation without one means interfering with the other.

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15). Other art of interest include Danek et al (6,155,198) with another showerhead + lamp configuration; and Harada (6,465,055 B2), Okase et al (6,228,173 B1), Ashizawa et al (2002/002379 A1), Horiguchi et al (6,402,848 B1), Hasei et al (6,224,934 B1) and Qian (6,649,218 B2), which are not prior art teach showerhead, UV radiation and oxygen input procedures of interest. Applicants' copending cases with overlapping inventors, 6,756,235 B1 to Lui et al, and Shinriki et al (2001/0018267 A1 = 09/795,437) are of interest, but sufficiently distinguished from the present claims.


16). Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Padgett/LR  
February 1, 2005

February 16, 2005



**MARIANNE PADGETT**  
**PRIMARY EXAMINER**